

AEC-NASA TECH BRIEF

Space Nuclear Systems Office

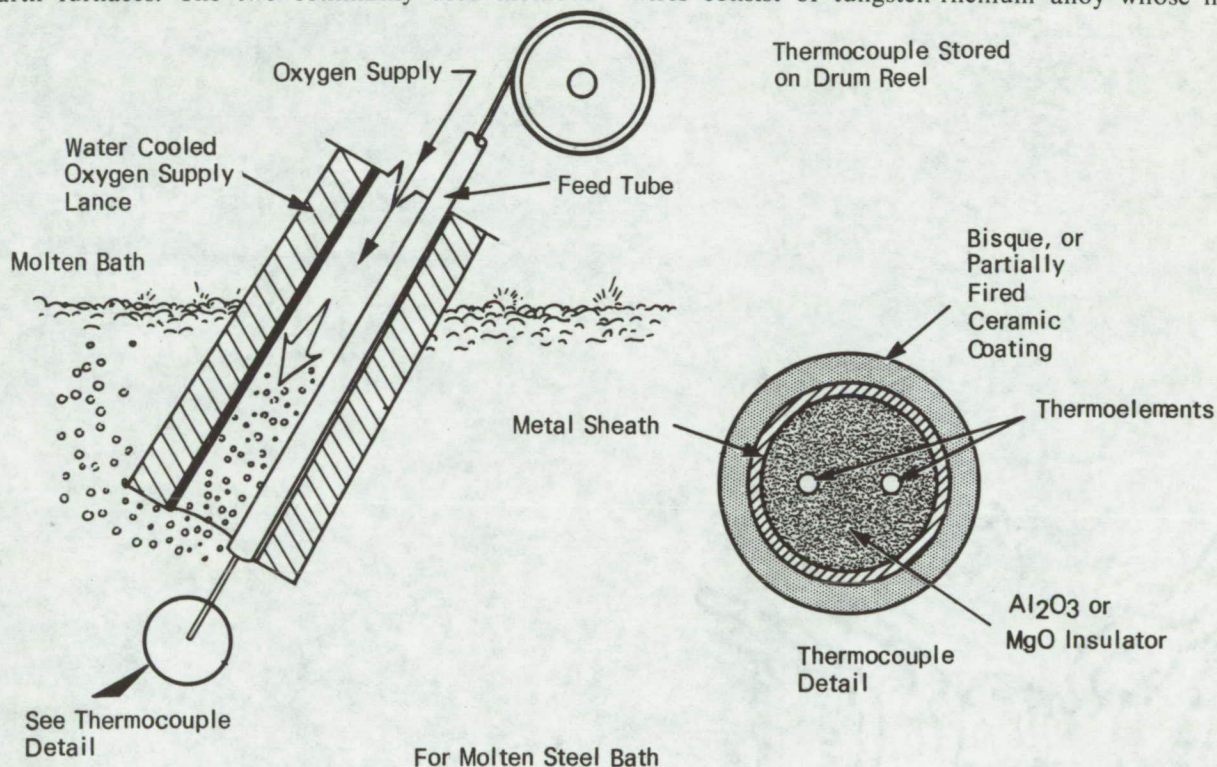


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Self-Replaceable Thermocouple for Molten Steel Bath: A Concept

A new thermocouple concept, which appears to be technically feasible, may be useful in closely monitoring temperature in basic oxygen and open-hearth furnaces. The two commonly used methods

The concept involves the use of a long thermocouple (see fig.) wound on a reel and fed continuously into the steel bath. The thermoelement wires consist of tungsten-rhenium alloy whose melt



are optical pyrometry and standard thermocouples. Of these, optical pyrometry provides a continuous output but is limited in accuracy; and standard thermocouples are accurate but only last for about 30 seconds when immersed in molten steel. The thermocouple concept evolved overcomes these disadvantages.

rate is held within acceptable limits by an ablative ceramic coating. The thermocouple junction is actually an open junction formed through the molten metal itself.

The principle has been proven in a series of tests, utilizing graphite as the conduction medium between the thermoelements, at temperatures above 2477.5°K

(continued overleaf)

(4000°F), and in conducting liquids such as boiling salt water. The reported accuracy and reliability of such temperature measurements is comparable to conventionally junctioned devices.

Notes:

1. Since the tip can erode at a rapid rate, an automatic reel feed control system should be considered.
2. A consumable tip thermocouple has been reported by North American Aviation (Tech Brief 66-10461), and commercial rights to the invention were waived to North American Aviation.

3. Requests for further information should be made to:

Technology Utilization Officer
AEC-NASA Space Nuclear Systems Office
U.S. Atomic Energy Commission
Washington, D.C. 20545
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Patent status:

No patent action is contemplated by AEC or NASA.

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